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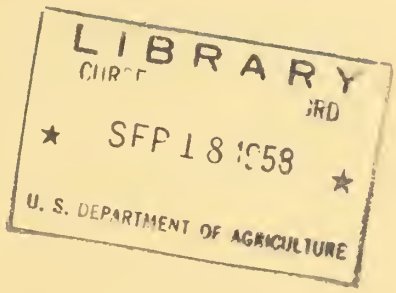
FEDERAL-GRANT RESEARCH

at the

STATE AGRICULTURAL

EXPERIMENT STATIONS



Projects on

AGRICULTURAL CHEMISTRY

Part 1

Agricultural Research Service
UNITED STATES DEPARTMENT OF AGRICULTURE

Compiled July 1958 by

The State Experiment Stations Division, Agricultural Research Service, U. S. Department of Agriculture, Washington 25, D. C., for use of workers in agricultural research in the subject-matter areas presented. For information on specific research projects write to the Director of the Station where the research is being conducted.

Issued September 1958

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Contents

INTRODUCTION

This compilation is one of a series providing information on State agricultural experiment station research supported by Federal-grant funds appropriated annually by Congress under authorization of the Hatch Act of 1887, as amended and approved Aug. 11, 1955, and Section 204(b) of the Agricultural Marketing Act of 1946. It is prepared for use by research workers in the subject-matter areas presented. Only that part of each State's research program supported by Federal-grant moneys is included.

In addition to the Federal-grant moneys, the State experiment stations receive some Federal support through cooperative agreements or contracts with the U. S. Department of Agriculture. Information on such research, along with other departmental research, is available in the Central Project Office, Agricultural Research Service.

A substantial part of each State agricultural experiment station's research is supported with moneys appropriated by the respective State or Territorial Legislatures and through other forms of private and public financing. Information on current agricultural research at the stations which is not financed under the Federal-grant program or through USDA cooperation can be obtained from experiment station directors.

The information given in the series of Federal-grant compilations includes the title and objectives of each Federal-grant project pertaining to the subject given on the cover. The identification of each project gives the department(s) conducting the research, the station number of the project, and the number of the regional project if it is a contributing project.

Relevant regional projects, if any, appear at the end of the compilation. States having projects contributing to regional projects are indicated. The Roman numeral (and capital letter) refer to the location in the summary of the contributing project title and objectives. The States are grouped into four major regions. These are designated NC-North Central, NE-Northeastern, S-Southern, and W-Western. The capital letter "M" following the letters for the region indicates regional marketing projects.

ANALYTICAL AND IDENTIFICATION TECHNIQUES AS APPLIED TO

Amino Acids and Proteins

Ark. The Biological Value of the Proteins in Different Cuts of Chicken Meat and in Chicken Organs. To (1) investigate the biological value of proteins in the white and dark meats of chicken muscle, livers, gizzards, hearts and lungs for growth, reproduction and lactation, and (2) reinvestigate the value of proteins of chicken muscle meats in relation to other animal proteins as indicated by various methods for determining biological value.

Agr. Chem. 418

Conn. Protein Chemistry. To study the properties of proteins and amino acids with special reference to the development of methods for their preparation and analytical determination.

Biochem. 202

Mich. Interrelationships of Protein, Calories and Amino Acids in the Nutrition of Aging Women. To (1) determine the intakes of some of essential amino acids in self-selected diets of aging women; (2) study the influence of calories, protein and amino acid intakes on nitrogen balance in aging women, and (3) develop improvements in microbiological assays for amino acids.

Food and Nutr. 532

Minn. The Chemistry of Milk as a Colloidal System. 1. The Chemistry of the Proteins of Milk. To (1) determine the nature and extent of natural variations in the composition of milk and the factors responsible for such variations; (2) isolate and characterize protein components of milk not as yet satisfactorily identified; and (3) study physico-chemical properties and behavior of systems of milk protein components.

Biochem. 1507

Nebr. Physico-Chemical Properties at the Molecular Level of Surfaces of Biologically Important Proteins Using Ovalbumin and Urease as the Principal Model Proteins. To (1) separate "pure" crystalline ovalbumin and urease into component fractions as per sedimentation and electrophoretic methods, and study physical properties of each of separated fractions; (2) compare the number and availability of phosphate and sulfhydryl groups in each fraction; (3) study contribution of groups to the physical and chemical properties of the protein surface and to protein interactions; and (4) compare ovalbumins and ureases from various sources and other proteins from milk and bovine serum albumin.

Biochem. and Nutr. 591

N. J. Isolation of Amino Acid-Nucleotide Complexes and Determination of Their Structure and Role in Protein Biosynthesis. To (1) isolate from ribonucleic acids the group of compounds that contain a riboncleotide attached to an amino acid; (2) fractionate these compounds; (3) determine the structure and nature of the nucleotide-amino acid linkage; and (4) study the role of these substances in protein biosynthesis.
Biochem. 1

N. Y. (Cornell) The Nitrogen Compounds of Plants and Their Metabolism. To (1) recognize, isolate and identify new soluble nitrogen compounds that occur as constituents of plants and to determine their mode of origin and function; (2) characterize protein fraction of plants by hydrolysis and quantitative estimation of amino acids so produced; and (3) investigate effects of nutritional and environmental factors on soluble and insoluble nitrogen fractions.
Plant Breeding, Plant Path., Botany 76

Okla. Nutritional and Chemical Evaluations of the Castor Plant (Ricinus Communis). To (1) evaluate the practicability of producing an animal feed from castor pomace, by removing toxins and the allergens; (2) investigate biosynthesis of alkaloids in seedlings; and (3) determine biological value of proteins of extracted pomace, with reference to the amount of the ricin, ricinine and allergen from castor pomaces and the amino acid content of the proteins.
Biochem. 1009

Wis. Physical and Chemical Properties of Milk Proteins Prepared by Various Methods of Separation and Fractionation. To (1) gain more fundamental information about the proteins as they exist in milk and how they are altered by manufacturing processes; (2) characterize physical and chemical properties of undenatured milk proteins; (3) study heat denaturation of milk proteins; (4) study protein interactions with other proteins, lipids, and carbohydrates; and (5) apply research findings to present manufactured products and to new products.
Dairying, Food Ind. 716

Carbohydrates

Calif. The Chemical Constitution of Carbohydrates and the Mechanisms of Their Formation and Breakdown. To obtain information on the fundamental structure of the complex carbohydrates (chiefly of plant origin) and biochemical mechanisms through which they are formed and broken down.
Biochem. 666

Calif. Pectin in Relation to the Soluble and Insoluble Carbohydrates of Immature and Mature Citrus Fruits. To (1) determine changes of pectin in relation to the soluble and insoluble carbohydrates of citrus fruits during growth and maturation; (2) study changes that occur in pectins of the peel of lemons during storage; and (3) determine physical and chemical properties of isolated pectins from mature citrus fruits in relation to their commercial value.
Plant Biochem. 1159

Calif. Fiber and Fibrous Feeds in Nutrition. To (1) study the utilization of isolated fiber (cellulose, hemicellulose, lignin and combinations) and fibrous feeds, by rats, pigs, cattle and sheep; (2) make chemical studies on methods of analysis and isolation of fibers; and (3) apply findings to the utilization of forage.
Anim. Husb. 1569

Del. Non-Cellulosic Constituents of Plant Cell Walls. To study the composition of plant cell walls with special reference to non-cellulosic constituents.
Agr. Chem. 25C

Iowa Structural and Enzymic Studies on Carbohydrates. To (1) prepare homogeneous carbohydrates; (2) examine the physical, chemical, and biochemical properties; (3) relate properties of these pure saccharides to corresponding properties of more complex saccharides, especially starch; (4) examine the structure, chemistry and biochemistry of complex saccharides by physical, chemical and biochemical methods, and (5) ascertain specificity and mode of action of carbohydrases.
Agr. Chem. 1116

Mass. Sorption Studies on the Hemicelluloses of Some Non-Woody Plants. To (1) apply sorption techniques to suspensions of hemicelluloses from non-woody plant tissues, and (2) develop means of fractionating hemicelluloses on the basis of preferential sorption.
Chem. 25

Nebr. The Enzymatic Interconversions of Carbohydrates in Metabolic Reactions. To investigate (1) mechanisms of conversion of 1, 4-glucosidic carbohydrates into 1, 6-glucosidic carbohydrates; (2) the synthesis and disproportionation of lactose; (3) the production of pentoses from hexose phosphatase; and (4) the isolation of enzymes involved in above reactions.
Biochem. and Nutr. 448

N. H. The Hemicellulose of Forage Crops. To determine what differences occur in the hemicelluloses of forage crops in different parts of the plant and as the plant matures.
Agr. and Biochem. 47

N. J. A Study of the Formation of Pectic Substances. To furnish some information concerning the synthesis of pectic substances.
Plant Phys. 505

N. Y. Chemistry of Pectin and Pectin Enzymes. To study mechanisms by which the pectic constituents of fruits change. Information is sought (1) on the mechanism of pectic transformation in fruits in vivo, and (2) on the mechanism of the known pectic changes which occur when fruit tissues are macerated as in the manufacture of many food products.
Food Sci. and Tech. 21

N. Dak. The Structure of Certain Carbohydrates in Flaxseed Hull. To determine more completely the structure of a complex carbohydrate found in the flaxseed hull.
Agr. Chem. 2-1

Ohio The In Vitro Digestibility of Cellulose from Various Sources and the Effect of Lignification Thereon. To (1) determine the digestibility (in vitro) of cellulose and cellulose-containing crude fiber fractions isolated from feedstuffs, and (2) attempt digestibility of cellulose in these materials.
Anim. Sci. 132

Pa. Oxidative Metabolism of Bacteria. To (1) study the metabolic reactions by which bacteria oxidize carbohydrate to completion; (2) relate oxidative metabolism of bacteria to reactions by which energy is trapped and synthetic carbon skeletons are formed, and (3) study the relationship between oxidative metabolism and photometabolism in photosynthetic bacteria.
Plant Phys. 1265

Wash. The Determination of Lignin in Forages. To develop a rapid and economical method of lignin determination which may be used as a measure of the digestibility of forages.
Agr. Chem. 1231

Fats

Calif. The Catalysis and Inhibition of Fat Oxidation at Low Temperature. To (1) measure the rate of catalysis of unsaturated fat oxidation at low temperatures by compounds such as hemin, hemoglobin, cytochromes and enzymes; (2) determine the relative effect of various antioxidant inhibitors; and (3) from these investigations, formulate mechanisms of catalysis and inhibition.
Food Tech. 1506

Calif. Relation of Food Intake to Tissue and Serum Cholesterol. To (1) test and evaluate a micro-cholesterol method, and (2) study the extent to which variation of total food intake will alter cholesterol content of serum and certain tissues in cholesterol-fed and controlled laboratory animals.
Home Econ. 1644

Ga. Susceptibility of Various Strains of Spanish Peanuts to Rancidity Development. To (1) determine the susceptibility of various strains of Spanish Peanuts to oxidative rancidity development, and to select less susceptible strains for production; and (2) isolate and characterize the factor or factors that are responsible for the difference in susceptibility of various types of peanuts to oxidative rancidity development.
Chem., Plant Path. 63

Ind. The Occurrence and Inheritance of Linolenic Acid in Soybeans and its Relationship to Other Fatty Acids. To (1) develop techniques and methods for rapid and accurate evaluation of fatty acids, especially linolenic acid in soybean oil; (2) study the range of fatty acid composition, especially linolenic acid, of foreign introductions of soybeans; (3) study the mode of inheritance of linolenic acid content of soybeans; and (4) develop strains of soybeans low in linolenic acid content which can be used in development of commercial varieties.
Biochem. 719

Iowa — A Study of the Oxidative Deterioration and of Adulteration of Milk Fat and of the Total Lipids of Dairy Products. To (1) complete a study of adaption of methods, normally used for food fats, to milk fats; (2) attempt to correlate the results of these methods applied to milk fat so that (a) storage life of milk fat and butter may be predicted, and (b) shelf-life of products made from milk fat or butter may be predicted; (3) determine whether or not short-time, high-temperature keeping-quality tests indicate storage-life of milk fat or butter; (4) determine if oxidation processes are the same in different portions of the same large lot of milk fat, when these different portions are stored at different temperatures; (5) apply methods developed for milk fat to milk lipids, in a study of oxidative deterioration of lipids in milk and cream, and (6) obtain information relative to types and amounts of tocopherols in milk fat and edible vegetable fats, and, from these data, evolve procedures for qualitative and quantitative estimation of the adulteration of milk fat with fats other than milk fat.

Dairy Ind. 1128

Ky. — Microbiological Techniques in the Determination of Rancidity in Pork Fat. To (1) isolate organisms sensitive to components of rancid fat; (2) develop a more rapid, accurate method for assaying rendered pork fat for rancidity; and (3) study the components of rancid fat acting as inhibitors of spore germination.

Anim. Ind. 265

Minn. — Factors Influencing Lipolysis in Milk. To (1) conduct a survey of the extent of lipolysis in milk from farms using different types of milking equipment; (2) determine the effect of various milking procedures and methods of handling raw milk on the initiation and degree of lipolysis; (3) develop a test to determine the susceptibility of milk to lipolysis; and (4) determine the mechanism of milk lipase action and factors influencing the rate, extent and nature of end products produced.

Dairy Husb., Agr. and Biochem. 1618

N. Dak. — Fat Acid Composition of Linseed Oil from the World Collation of Flax Varieties. Find a flax variety producing a quick drying oil that is non-yellowing in paint and that has the following properties: high linoleic acid content, low linolenic acid content, low saturated and oleic acid content.

Agr. Chem. 2-5

Pa. Physical and Chemical Properties of Fats and Fat Acid Derivatives in Relation to Their Composition, Structure, and Utilization. To (1) develop and improve techniques for analysis of fats; (2) obtain more complete knowledge of structure and composition of various glycerides comprising each of the more common fats; (3) improve the usefulness of fats by adding substances or removing others; (4) obtain more complete knowledge of the physical and chemical characteristics of various fat acid derivatives; and (5) study fat deterioration and factors influencing such spoilage.
Agr. and Biol. Chem. 1188

Pa. Isolation and Identification of Intermediates in the Metabolic Degradation of Cholesterol. To (1) identify metabolic intermediates in the synthesis and degradation of cholesterol in animals and (2) ascertain relative rates of conversion of these metabolic intermediates in various organs and tissues of animals.
Agr. and Biol., Chem. 1341

Tex. The Chemistry and Metabolic Behavior of Naturally Occurring Fats and Fatlike Substances. To devise methods of analysis to study chemical structure and to investigate the biochemical behavior of fatty substances.
Biochem. and Nutr. 609

Minerals

Idaho The Effect of Fluoride on Plant Enzyme Systems and the Nature of Fluorine Compounds Present in Plant Tissues. To (1) study the effect of fluorides on plant enzymes of resistant and susceptible plant species, and (2) determine how fluorides exist in plants, if as an inorganic constituent or in some combination with protein, lipids or other material.
Agr. Chem. 293

Ill. Methods in the Spectrographic Analysis of Soils and Plants for Minor Elements. To (1) develop rapid, accurate, and reproducible methods for the determination of copper, zinc molybdenum, cobalt and iron; (2) investigate fully the possibility of direct determination of the minor elements in plants; and (3) study solution techniques in spectrographic analysis.
Agron. 15-361

Miss. Methemoglobin Levels in the Blood and Nitrate Levels in the Urine of Small Laboratory Animals Fed Subletnal Amounts of Nitrate. To determine (1) if small laboratory animals undergo poisoning, as measured by methemoglobin levels, when sodium nitrate is incorporated into the diet over a subletnal range; and (2) the range of feeding levels over which methemeglobin may increase.
Home Econ., Chem. HJ-4 HF-5

Ohio — Development of X-ray Diffraction Techniques for Plant Materials. To develop new techniques and modify existing ones for determining the presence and molecular structure of mineral salts in studies of mineral nutrition of plants.
For., Agron. 89

S. Dak. — Farm and Home Water Quality Improvement. To (1) investigate ways to reduce the salt content of farm water supplies and adapt them to the farm water system; (2) study ways for home laundering in excessively hard waters which will give suitable whiteness retention and fabric strength retention; and (3) study the effects of various types of high salt waters on flavor, texture, and nutritional value of foods.
Biochem. 275

Vitamins

Iowa — Sulfonated Sterols in Nutrition. To (1) illucidate the action of the antirachitic vitamins on the theory that in vivo sulfonations are induced by vitamin D; (2) determine the location of sulfonic acid groups in antirachitic cholestatetraene sulfonic acid; and (3) synthesize analogous derivatives with and without radioactive carbon and to study the biological activity of these derivatives.
Chem. 1115

Kans. — Development of Methods of Analyses for Vitamins A and D in Mixed Feeds and Feed Premixes. To develop methods or modifications of present methods, for routine determinations of vitamins A and D in mixed feeds and premixes.
Chem. 345

N. C. — Riboflavin Content of Soybeans and Cowpeas. A. Growth Stimulant(s) Associated with Riboflavin in Soybeans. To (1) compare the results of the growth bioassay for riboflavin with those obtained by the photofluorometric method; and (2) isolate and determine the nature of interfering substances.
Anim. Ind. H-18

N. C. — Factors Influencing the Biosynthesis of Carotenoids by Yeasts. To (1) identify and characterize carotenoid pigments produced by certain species of yeast; and (2) determine the influences of cultural conditions on carotenoid production by these yeasts.
Chem. 41

Enzymes

Calif. Pectic Enzymes of Fungi. To (1) determine the role of yeasts and other fungi in the hydrolytic breakdown of pectic substances, surveying representative species of yeasts as to their ability to form enzymes capable of causing degradation of pectic substances, and (2) investigate the mechanism of enzymic actions on pectic substances.
Food Tech. 1522

Conn. Enzyme Catalyzed Changes in the Curing of Tobacco and the Relation of These Changes to Quality and Thus to Market Value. To (1) study enzymatic reactions occurring in green leaves; (2) isolate and purify enzymes bringing about these reactions; and (3) study the role enzymes play in the metabolism of the tobacco leaf.
Biochem. 205

Iowa The Mechanism of Action of Water-Soluble Vitamins in Enzymic Catalysis. To (1) study mechanisms of non-enzymic catalytic reactions which may be regarded as models for enzymic reactions in which vitamins function; (2) study other aspects of the chemistry of these vitamins which may shed light on their catalytic functions; and (3) deduce hypotheses concerning mechanisms of enzymic catalysis employing these non-enzymic studies and modern concepts of organic reaction mechanism.
Chem. 1259

Kans. Enzymatic Separation Applied to the Determination of Collagen in Meat. To determine the effectiveness of certain proteolytic enzyme preparations in releasing collagen from combination, association, or entanglement with contiguous muscle protein structures.
Home Econ., Chem. 419

Nebr. Enzymes of Wheat and Flour and Their Relation to Baking Characteristics. To study methods for identification and estimation of flour enzymes; and their relation to flour properties.
Nutr., Chem. 184

Nebr. Naturally Occurring Enzyme Inhibitors and Their Nutritional Significance. To study (1) the occurrence of enzyme inhibitors in natural feedstuffs; (2) the mode of action of such inhibitors; (3) their nutritional significance; and (4) means for counteracting effects of these inhibitors.
Agr. Chem. 308

N. Y. Relation Between the Presence of Oxidizing Enzymes and Keeping Qualities of Frozen Fruits and Vegetables. To determine the presence of certain enzymes in fresh and processed plant materials and the bearing of these enzymes on the blanching requirements and keeping qualities of processed fruits and vegetables.
Food Sci. and Tech. 81

N. Dak. An Investigation of the Susceptibility of Starches to Attack by Alpha-Amylase. To develop a reliable method for estimating alpha-amylase activity of ungerminated cereals through a study of the effect of starch gelatinization temperature and retrogradation upon alpha-amylase activity.
Cereal Tech. 10-3

N. Dak. Physical and Chemical Properties of Milk Esterases (Lipases) To determine (1) if enzymes of milk which hydrolyze milk fat, producing a rancid flavor may be measured by new photometric methods; (2) physical and chemical properties of milk esterases (lipases); and (3) the influence of breed, stage of lactation, feed and management on esterase content of milk.
Dairy Ind. 11-1

Okla. The Biochemical Mechanism of Action of Enzyme Inhibitors. To (1) find a suitable source of an adaptive enzyme whose production is sensitive to antagonists; and to perfect techniques for assaying and isolating this enzyme; (2) induce enzyme formation in a medium containing a radioactive antagonist and to determine if any antagonist has been incorporated into the enzyme molecule; and (3) determine whether or not a modified enzyme is functional if the enzyme is found to contain antagonist residues.
Agr. Chem. 961

Pa. Determination of Oxidative Enzyme Systems and Oxidative Pathways in Higher Plants. To (1) develop and improve techniques for detecting the presence and measuring the activity of oxidative enzymes; (2) determine the presence and activity of oxidative enzymes in higher plants; and (3) relate the presence of oxidative enzymes to metabolic pathways in higher plants.
Agr. and Biochem. 1218

Pa. The Initiation of Synthesis, Biological Stability and Mechanism of Formation of Adaptive Enzymes in Micro-Organisms. To (1) study the mechanism of induction of enzyme syntheses; (2) investigate *in vivo* stability of adaptive enzymes of cells under stress and of the availability of constituent amino acids for other syntheses; and (3) study the specific effects of environment on the formation of adaptive enzymes.
Plant Phys. 1253

Unidentified Factors

Colo. Antianemic and Growth Factors as Related to Amino Acid Utilization in the Chick. To study the effects of vitamin B_{12} and other anitanemic and growth factors on the metabolic use of amino acids under various conditions.
Chem. 88

Ind. Unrecognized Factors in Natural Feeds Which Reduce Amino Acid Requirements. To isolate and identify factors in natural feeds which reduce essential amino acid requirements.
Biochem. 741

La. Separation and Characterization of Growth Promoting Substances in Plant Extracts. To (1) isolate and identify microorganisms requiring for maximum growth the addition of certain plant extracts to a medium containing all known B-vitamins; (2) study chemical, physical and biological properties of these extracts; (3) develop methods of isolation and purification for the extracts; and (4) identify or characterize new isolated growth factors.
Agr. Chem. 865

Vt. Azotobacter Investigations. To (1) study survival rates of various strains of Azotobacter under different conditions of growth and preservation, and (2) produce, extract, purify, measure, and characterize the fluorescence produced by these bacteria.
Biochem. 73

W. Va. The Nutrition of Fungi and Bacteria with Especial Reference to Substances which Induce, Stimulate, or Inhibit Growth and Reproduction. To (1) study exact nutritional requirements and metabolic processes of various fungi and bacteria, (2) isolate, identify and test chemical substances required for growth and reproduction, and study mechanisms of inhibition of life processes, (3) utilize fungi and other microorganisms for qualitative and quantitative assay of substances of physiological activity, and (4) study inheritance of certain physiological characters in fungi.
Plant Path. 28

Other Factors Including Special Components or Additives

Colo. A Study of the Mechanisms of Metabolic Reactions as Influenced by Minor Constituents or Chemical Additives in Feeds or Foods. To investigate metabolic reactions of selected microorganisms, as affected by certain chemical additives and minor food constituents used in nutrition.
Chem. 87

Colo. Isolation and Identification of the Polyphenols of Crop Plants and a Study of Their Properties and Biochemical Function. To (1) quantitatively estimate polyphenolic constituents of crop plants with reference to plant parts used for food; (2) separate and identify principal polyphenols of specific plant species and varieties; (3) study and consider properties of separated and identified polyphenols; and (4) establish various biochemical functions for isolated polyphenols.
Bot. Chem. 92

Minn. The Fundamental Properties of Colloid Systems with Particular Reference to Biological Problems. To study (1) fundamental laws governing colloid systems; and (2) properties of such systems under varied and determinable conditions.
Biochem. 1511

Minn. Isolation and Characterization of Plant Hemagglutinins. To isolate and characterize the phytoagglutinins present in lima beans, kidney beans, navy beans, and other legumes known to possess hemagglutinating activity.
Agr. Biochem. 1516

N. J. The Role of Non-Nutritive Additives in Commercial Feeds. To (1) develop chemical and biological methods for testing and evaluating non-nutritive additives incorporated in feeds including the improvement of current analytical methods; (2) investigate chemical and physical changes of additives brought about by components within feeds; (3) evaluate mixing procedures to obtain uniform mixtures of additives in premixes and in the finished feed; and (4) investigate fundamental physiological effects that non-nutritive additives may have on test animals, including antagonistic and synergistic effects of combinations of additives and the nutritional value of feeds containing one or more additives.
Agr. Chem. 104

N. J. The Decomposability of Tannins and Tannin Complexes. To (1) study decomposability of complex of tannins and other organic materials; (2) compare decomposability of complexes with that of the tannins and other organic materials separately; (3) determine the influence of reaction (pH) and other environmental factors on decomposition of organic materials; and (4) determine the decomposability in solution culture media in solid vehicles as sand.
Agr. Microb. 403

Pa. A Study of Leaf Analysis Techniques. To (1) study methods of improving the techniques involved in sampling and preparing leaf samples for analysis; and (2) develop improved analytical procedures for leaf analysis
Hort 874-C

Pa. The Biosynthesis of Penicillin. To study the mechanism by which certain penicillium molds synthesize the penicillin molecule.
Bact. 1118

S. C. Pesticide Residues- Determination; Effect on Plants and Soils.--A. Biological and Chemical Determinations of Pesticide Residues in the Soil. --B. Effects of Pesticide Residues on Plants and Soils. To (1) standardize and apply biological and chemical methods of pesticide residue analysis with chemical analyses to integrate results from biological and chemical analytical techniques; and (2) evaluate effects of pesticide residues on plant growth, plant products and soils.
Ent. Agron., Chem. 53

Wis. Immunogenetic Studies of the Antigens of Pigeon and Dove Species and of the Chicken and Cattle. To study in species crosses, especially pigeons and doves, (1) distribution of species-specific properties in the offspring and backcrosses including agglutinogens and the genes responsible; (2) correlation of serological relationships with fertility and the presence or absence of sperm abnormalities; and (3) possible linkage relationships between these biochemical characters and other qualitative and quantitative characteristics.
Biochem., Dairy Husb., Gen. Phys. 545

Wis. Applications of Plant Growth Substances and Their Mechanism of Action. To (1) amplify present applications, (2) develop new uses for plant growth substances, (3) determine the manner in which they exert their effects, and (4) investigate their use in controlling starch production of peas and their influence on protein content of field crops.
Agron., Biochem. 755

CHEMICAL INVESTIGATIONS RELATED TO QUALITY PRODUCTION AND USE OF AGRICULTURAL PRODUCTS

Ala. The Market Value of Peanuts as Affected by Changes in Chemical and Physical Properties During Storage. To study (1) effects of storage on chemical, biochemical and physical changes in peanuts; (2) the relationship of initial quality of peanuts to changes during storage; (3) the relation of microflora to respiration and associated deteriorative changes in peanuts; and (4) relationships between chemical, biochemical, and physical factors affecting the market value of peanuts.

Bot., Plant Path. 570

Colo. Investigations in Wood Utilization, Preservation, Seasoning, and Technology to Induce More Efficient Use of Colorado's Native Woods. To (1) determine inherent wood characteristics and problems associated with the use of native woods which have not been adequately tested; (2) compare the effectiveness of different preservatives and treatments designed to prolong service life of native woods used for farm, structural, and other purposes, and to develop new preservatives and treatments where existing ones are unsatisfactory; (3) develop new products from and uses for native woods, including woody plants which are undesirable on rangelands and potential farmlands; and (4) develop new uses for by-products of wood utilization industry.

For. 70

Conn. Chemical Appraisal of the Market Grades of Tobacco and of the Changes that Occur in the Curing and Fermentation Processes. To establish objective methods of defining quality in tobacco used for wrappers and binder, to extend previous basic research in the chemistry of curing tobacco, and to utilize these results in practices in the marketing of tobacco.

Biochem. 204

Conn. Components of Cigar Tobacco Leaf Which Contribute to Market Quality, in Particular to Odor. To (1) identify chemically substances in fermented tobacco which give its characteristic odor; and (2) study the manner in which these substances arise and how the quantity present can be altered or controlled.

Biochem., Plant Path. 206

Conn. Dynamics of Fungicidal Action. To discover chemical and physical basis for fungicidal action, and to use these discoveries for building newer and better fungicides.
Plant Path. 634

Conn. Curing and Fermentation of Cigar Wrapper and Binder Tobacco. To determine which chemical reactions in curing and fermentation processes lead to high quality in cigar tobacco and to promote these reactions by controlled curing and fermentation so as to produce leaves of higher and more uniform quality.
Plant Path., Bot. 646

Ga. Roasting Peanuts. To study the chemistry of the process of roasting peanuts and to determine the effect of variations in the process on the resulting product.
Chem. 62

Hawaii Assay of Native and Introduced Tropical Plants for Products of Economic Value. To (1) gather information regarding content of plant products of economic value in certain tropical plants; (2) evaluate quality of product, if present in relatively high concentrations; and (3) study possible methods for commercial processing of products.
Agr. Biochem. 620

Ill. A Study of Chemical Changes Which Occur During the Aging of Surface Ripened Cheese. To study the rate of hydrolysis of protein, carbohydrate, and fat in surface ripened cheese, and to determine the end products as they are liberated in the cheese during aging.
Food Tech. 50-347

Ind. Development of High Amylose Corn. To (1) develop inbred lines with gene combination rendering them high in amylose and agronomically desirable; (2) test strains of corn produced by breeding for amylose content; (3) characterize carbohydrates of high amylose starch strains; and (4) develop hybrid combinations of inbreds produced.
Biochem., Agron., Bot. 889

Iowa The Quality of Products Prepared from Cereal Grain: 1. Factors Associated with Consistency of Starch Products. To increase acceptability of products containing grain or grain-fractions by elucidation of factors affecting the quality of those prepared foods.
Home Econ. 1366

Kans. Micromeasurements of Physical Grain Properties. To (1) develop and modify micro-radio-graphic techniques and metallurgical hardness testing methods to permit rapid micro-determination of hardness and density of wheat kernels; and (2) correlate these measurements with those technological properties of wheat and wheat products of concern to agriculture and the flour milling industry.

Phys., Flour and Food Mill. Ind. 478

Kans. Biochemistry and Physiology of Egg Formation. To study relationships of (1) high-phosphorus high-lipid containing components of blood serum to egg formation; (2) various endocrine secretions to fluctuations in the amounts of these substances; and (3) natural and artificially induced variations of light and temperature to these substances and to egg formation.

Chem., Poul. Husb. 503

Md. Influence of High-Temperature Heat Treatment on Certain Physical and Chemical Properties of Milk. To (1) gain more fundamental knowledge of the chemical reaction occurring in heated milk such as heat-induced flavor, changes in solubility, browning of the product, etc., and (2) make practical application of the control of heat induced effects in established dairy products as well as new dairy products resultant from products development research.

Dairy G-40

Mich. Fundamental and Applied Colloid-Chemical Aspects of Agricultural Chemistry. To (1) improve or devise new wax emulsions for treating nursery stock and plant materials so as to reduce their cost of production and increase usefulness in horticultural and other practices; and (2) develop new or improved formulations and methods for the production of colloidal iodine.

Chem. 1

Minn. The Biochemistry of Milling, Baking, and Macaroni Manufacture. To determine (1) the fundamental principles involved in the conversion of wheat and typical wheat products into "bread stuffs"; (2) the quantity and nature of various wheat and flour constituents and their effect upon processing requirements; and (3) the function of typical ingredients of the formulas followed in manufacturing such foods.

Biochem. 1, 2, 3, 4 1503

Minn. Storage of Grain in Various Atmospheres in Sealed Bins. To determine the effects of various atmospheres on the microbiological, entomological, and biochemical factors that influence the quality of stored grains.
Agr. Biochem. 1517

Miss. Chemical Studies Related to the Quality of Sorgo Juice for Sirup and Sugar Production. To evaluate various factors that influence the quality of sorgo juice for sirup and sugar production.
Chem. HF-1

Nebr. Studies of Flour and Baking Quality Factors by Methods Involving Fractionations and Recombinations of Protein, Starch, and Other Flour Components. To determine the extent to which various individual fractions of flour, starch, protein, and other components, influence flour baking behavior and hence the industrial utility of wheat.
Chem. 129

N. Dak. Chemical Modification of Flaxseed Mucilage. To (1) prepare chemical modifications of flaxseed mucilage; (2) study physical and chemical properties of these chemical modifications; and (3) determine if modified mucilages may be commercially useful for gelling agents, emulsifiers, adhesives, or wetting agents.
Agr. Chem. 2-4

N. Dak. Wheat Protein Fractions and Baking Quality. To determine the cause of differences in baking quality between protein fractions from different hard red spring and durum wheats and to ascertain the effects of proteolytic enzymes upon properties and relative distribution of these protein fractions.
Cereal Tech. 10-1

Pa. Identification of Flavor Compounds in Cheese. To identify compounds having characteristics of cheese flavor and aroma.
Dairy Husb. 1142-C

P. R. Methods for Evaluating and Grading Rums for Different Markets to Meet Consumer Preferences. To (1) develop analytical procedures for quality appraisal of rums; (2) study tasting procedures possible in evaluating consumer preferences for rums in different market areas; and (3) study correlations existing between consumer preference data and physical properties of rums.
Rum Pilot Plant. 50

P. R. Microbiological Studies on the Utilization of Molasses. To (1) search for new strains of microorganisms that better satisfy needs of alcoholic, lactic, citric, and acetic fermentations; (2) produce, through artificial hybridization, new strains of yeasts that will more efficiently carry out alcoholic fermentation, yielding products of higher quality; and (3) determine optimum conditions under which microorganisms used for the above fermentations would carry out desired transformations.

Rum Pilot Plant. 57

S. C. The Causes and Prevention of Discoloration in Stored Pungent and Paprika Peppers. To (1) develop a quick test to predict color stability on aging; (2) develop a practical method of preventing discoloration; and (3) determine the more important chemical reactions that take place in discoloration of cayenne pepper and paprika.

Chem. 45

Tenn. Group D Streptococci Isolated from Plants. To (1) determine whether streptococci isolated from plants are epiphytic, or whether they originate from some other source, and (2) determine whether streptococci isolated from plants possess properties distinctive from other streptococci.

Chem. 173

Tex. The Chemistry of the Poisonous Plants of Texas. To (1) isolate and identify chemical compounds responsible for harmful properties of poisonous plants growing on the range; (2) study the effects of season of year and weather conditions on the amount of poisonous substances contained in plants; and (3) develop antidotes against these chemical substances.

Biochem., Nutr. 919

Utah Chemical Techniques for Detecting Flavor Changes During Meat Processing. To develop chemical techniques for the rapid and reliable evaluation of flavor of processed meat, and to correlate chemical techniques for evaluating flavor with organoleptic tests.

Bot., Plant Path., Food and Nutr. 458

Vt. The Biochemistry of Naturally Occurring Flavanoid Compounds. 1. Role in Plant Disease Resistance. 11. Functions in the Cross. To (1) correlate the presence of flavanoid compounds with disease resistance in plants, particularly in Impatiens Balsamina, and (2) determine flavanoid compounds in Trifolium pratense and Trifolium medium and their influence on crossability of these species.

Bot. 42

Va. Vinegar Production by the Submerged Fermentation Process. To (1) determine yield and speed of vinegar fermentation from apple cider for several acetifying bacteria; (2) determine the effect of added bacteria nutrients to apple cider for increasing yield of acetic acid and speed of fermentation; and (3) compare apple varieties as to their suitability for vinegar production by submerged fermentation process.
Hort. 86088

Wash. Metabolism of Germinating Peas. To study the nature of reactions which take place during germination of pea seeds, mechanisms by which reactions are controlled, and resulting changes in constituents of plant.
Agr. Chem. 769

Wash. The Synthesis of Radioactive Labeled Systemic Insecticides and Their Plant Metabolic Products. To synthesize labeled systemic insecticides and their decomposition products for use in investigations of the problems involved in application of systemic insecticides to agricultural crops.
Agr. Chem. 1229

Wash. Identification of the Components of Flavor in Lamb and Mutton and Application of This Information Toward Increased Utilization of These Meats. To (1) investigate components of flavor of fresh and cooked lamb and mutton and their intensity by use of chemical, physical, and sensory techniques of identification; (2) determine the effects of the method of cookery on lamb and mutton flavors and (3) study the effects of breeding and management on the quality of lamb and mutton.
Home Econ. 1375

W. Va. Prevention of Rancidity in Carcass Fats of Turkeys and Hogs. To (1) study methods to delay the development of rancidity in carcass fats of turkeys and hogs; (2) develop and evaluate methods to predict how long carcass fats will keep without becoming rancid under normal storage conditions; and (3) obtain information on movement of vitamin E and other antioxidants from circulatory system to depot fats of living birds and animals.
Anim. Husb., Agr. Biochem. 6

Wis. Nature of Disease Resistance in Plants. To determine the nature of the differences which commonly exist between individuals, strains, varieties, and species of plants in their susceptibility or resistance to disease.
Biochem, Plant Path. 269

LIST OF COMPILATIONS OF FEDERAL-GRANT RESEARCH PROJECTS
AT STATE AGRICULTURAL EXPERIMENT STATIONS

ARS-23-8: Part Numbers	Subject-Matter Area	Title of Section
1	Agricultural Chemistry	Agricultural Chemistry
2	Agricultural Economics	a. Prices, Incomes, & General Studies of Commodities & Industries b. Farm Management c. Land Economics d. Farm Finance & Taxation
3	Agricultural Engineering	a. Land & Water Use & Development b. Power Machinery & Equipment c. Farm Structures & Materials
4	Animal Husbandry	a. Beef Cattle b. Sheep & Goats c. Swine
5	Dairy Husbandry	Dairy Cattle
6	Dairy Technology	Dairy Technology
7	Entomology & Economic Zoology	a. Field Crop Insects b. Fruit, Nut & Vegetable Insects c. Miscellaneous Insects & Economic Zoology d. Insecticides
8	Field Crops	a. Cereal Crops b. Oil, Fiber, Tobacco & Sugar Crops
9	Food Science & Technology	a. Food Chemistry, Microbiology, Sanitation & Public Health b. Food Engineering, Processing, Product and Process Development, Utilization and Waste Disposal c. Food Quality & Standards, Acceptance, Preference, & Marketing
10	Forage Crops, Pastures & Ranges	Forage Crops, Pastures & Ranges
11	Forestry	Forestry

ARS-23-8: Part Numbers	Subject-Matter Area	Title of Section
12	Fruits & Nuts	Fruits & Nuts
13	Home Economics	a. Human Nutrition b. Housing c. Clothing & Textiles d. Foods-Consumer Quality & Utilization e. Household Economics & Management
14	Economics of Marketing	a. Field Crops b. Fruits & Vegetables c. Livestock, Meats & Wool d. Dairy Products e. Poultry & Poultry Products f. Forest Products & Ornamental & Drug Plants g. Cross-Commodity & Functional Studies
15	Meteorology	Meteorology
16	Ornamental & Drug Plants	Ornamental & Drug Plants
17	Plant Pathology & Bacteriology	a. Plant Pathology, Botany, & Diseases of Miscellaneous Crops b. Diseases of Field Crops c. Diseases of Fruit Crops d. Diseases of Vegetable Crops
18	Plant Physiology & Nutrition	Plant Physiology & Nutrition
19	Poultry Industry	Poultry Industry
20	Rural Sociology	Rural Life Studies
21	Soils	a. Soil Chemistry & Microbiology b. Soil Fertility, Management & Soil-Plant Relationships c. Soil Physical Properties, Conservation & Classification
22	Vegetables	a. Vegetable Crops b. Potatoes
23	Veterinary Science	Veterinary Science
24	Weeds	Weed Control